

Hydrotherapy in the Management of Sprains, Strains and Muscular Spasms

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SIMPLE physical remedies have been used in the management of the sick and disabled from the beginnings of recorded history. Experiences throughout the centuries have provided innumerable evidences of such remedies, giving symptomatic relief, promoting general health, alleviating pain and giving a sense of physical fitness and well-being.

Physical medicine is both the oldest and newest in medical practice. It has become one of the newest fully recognized specialties under the name of physical medicine and rehabilitation.

Simon Baruch, who is probably one of the greatest exponents of physical medicine of modern times wrote, "Of all remedial agents in use since the dawn of medicine, water is the only one that has survived all of the vicissitudes of doctrinal changes, because its rise and fall was always contemporaneous with the rise and fall of intelligence among medical men." The systemic application of physical agents is distinctly a 20th century innovation.

Dr. Phillip T. Johnson¹ states that during World War II, it became a major service in the Armed Forces Hospitals on the same level as medicine and surgery.

Physical medicine includes the treatment and diagnosis of disease by physical means.² As it has developed it includes the fields of physical reconditioning, physical therapy, occupational therapy and physical rehabilitation. Interest in this field was stimulated by the rehabilitation problems which arose during World War II. A greater understanding of the application of physical agents is necessitated at this time, because of the high-current incidence of accidental injuries, the increase in socio-economic problems in relation to our aging population and the greater proportion of chronic degenerative diseases encountered in present day practice.

Krusen defines physical therapy as including the use of the principal agents; light or radiant therapy; heat or thermotherapy; electricity or electrotherapy; water or hydrotherapy and kinesitherapy which includes massage manipulation, therapeutic exercise and the use of mechanical devices.

It is my purpose to discuss briefly the scientific use of hydrotherapy in the management of sprains, strains, muscular spasms, varicosities and varicose ulcers, as prescribed by the physiatrist or specialist in physical medicine. The scientific physician of today recognizes the need for the physical agents in his daily practice.

Heat or thermotherapy is one of the basic procedures in everyday use in the practice of physical medicine. The physiological effects of heat are too well known to require much discussion here. Heat increases peripheral circulation, expedites the healing of diseased or injured tissues, alleviates pain, and is associated with the subsidence of muscle spasm and the mobilization of stiff joints. The methods of applying heat therapeutically have been classified in three main types or divisions: radiant heat, conductive heat and convective heat. All hot baths utilizing the Hubbard tank and many other hydrotherapeutic procedures such as: whirlpool, contrast baths, hot packs, compresses, etc., are classified under conductive heating.

Preheating augments the functional capacity of skeletal muscles. Although heat is one of the most valuable adjuvants in the physician's daily use of therapeutic procedures, it also can be misused. Heat in any form should be used with great caution, if at all, in advanced peripheral diseases, and never used when there is malignancy. Local applications of heat should not be used over hemorrhagic diseases or tissues where there is a tendency to hemorrhage or when there is pregnancy. It is on this basis that cold should be applied early after an acute sprain, strain or fracture, with the application of heat being considered only after the first

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twenty-four to forty-eight hours, when it is evident hemorrhage has subsided.

The treatment of acute injuries demand close attention and a willingness to devote time to the individual patient. After these injuries the patient should not be dismissed with instructions to "immobilize and rest." Essential damage in a sprain may be a torn ligament, tenosynovitis or varying degrees of traumatic arthritis and extravasation from torn vessels.

Water serves as an excellent medium for the production of the modification of skin temperature. This is due to its absorption and giving off of heat and cold quickly. The mechanical impact of water delivered under pressure to the skin surface excites the sensory nerve terminals; hence the refreshing value of the shower over the full bath.

It is essential to know the temperature value of the different baths, inasmuch as hydrotherapeutic procedures depend in a large measure on the difference in skin temperature and that of the bath.

Krusen³ cites the following chart for hydrotherapeutic procedures:

	Degrees	
	Fahrenheit	Centigrade
Ice	32.....	0
Cold—less than	65.....	18.3—23.9
Tepid	75—92.....	23.9—33.3
Neutral	32—97.....	33.3—36.1
Hot	98—104.....	36.1—40
Very hot	104—105.....	40 —46.1

Of the many types of hydrotherapeutic measures that are available in the armamentarium of medical practice, I shall offer, from experience in our department, the whirlpool and paraffin baths as the most applicable, efficient and practical for the management of sprains and strains—also muscular spasms.

The effect of the whirlpool bath is to produce a very marked dilatation of the peripheral blood vessels in the extremity immersed. It is a hydrokinetic measure and the temperature of the water is kept at 110° to 115°F., and is in constant agitation. Kovacs⁴ writes. "The whirlpool bath is a most valuable treatment in a large number of traumatic and chronic inflammatory conditions. It is excellent for early treatment of stiffness, pain and sluggish skin circulation following fractures, and

constitutes the best treatment which can be given as soon as a fractured limb can be taken out of its immobilization. In painful scars, adhesions, peripheral nerve injuries and some forms of neuritis, joint stiffness, and suitable cases of arthritis, tenosynovitis, indolent and chronic suppurating wounds, painful stumps, weak and painful feet, it is also employed with benefit." The combined action of heat with the gentle mechanical massage and softening effect of the whirling water which gives off air bubbles shows a marked response in the tissues. After a treatment which may last from 15 to 45 minutes, the skin becomes flushed and warm, inflammatory induration is softened, pain and spasm relieved, the repair of the wound is stimulated and the removal of necrosed tissue and pus is speeded up.

The paraffin bath affords a very simple and efficient method for applying heat to the surfaces of the body, especially to hands and feet following traumatic conditions, as sprains, contusions, strains and osteoarthritic conditions. Zeiter⁵ of the Department of Physical Therapy, Cleveland Clinic, made a study of the use of paraffin. During World War II, it was used extensively for the treatment of injuries of the extremities. Zeiter states, "A temperature of 130° to 136°F. is readily tolerated by the skin when paraffin is applied, although it is well known that a water bath of this temperature would burn the skin. He states that "As Lampert explains this tolerance, it is possible that through the high temperature, a heat insulating layer of water vapor is formed between the skin and the paraffin, thereby preventing the high temperature compound from coming in direct contact with the skin." The technic of applying paraffin is very simple. The affected part, being thoroughly bathed and dried first, is dipped into the paraffin and out, quickly, until a thin coating congeals on the skin.

This is repeated several times, until a thick coating of six or eight layers is formed. This is allowed to remain over a period of 30 to 45 minutes. Paraffin can be used on the body surface when other forms of heat are not available. For this purpose, it is applied with a clean paint brush until a thick layer is on. When the paraffin is removed, like an adherent glove, the skin is found to be soft and pliable with a marked hyperemia, which seems to persist over a considerably longer period than other types of heat therapy. The con-

trast of the skin, being moist and smooth after paraffin, to that of being shriveled and withered, after whirlpool, is considered by some authorities, the advantage of using paraffin over whirlpool.

Because of the marked heat, paraffin bath must be used judiciously in old, weak, and debilitated individuals. If circulatory and sensory changes are present, paraffin should be used with caution because of the danger of burns. Open wounds, cuts and infections of the skin are better treated by other methods.

In the department at Freedmen's we have available about twelve various modalities with a large complement of mechanical devices for the accomplishment of re-education and rehabilitation. With these modalities, we had for the fiscal year 1952, the following:

Total Treatments, 12,630.

Patients visits, 7,528.

Hydrotherapy, 2,923.

Paraffin, 1007.

Over a five year period with a total number of 16,435 treatments in hydro and paraffin, we did an average of 28.5 per cent in those two modalities. A further analysis of this figure reveals that 50 per cent of these treatments were in sprains, strains, and muscular spasms.

SUMMARY

1. All applications of hydrotherapy must be prescribed by the physiatrist.

2. Hydrotherapy is pre-eminently one of the most valuable modalities for use in local heating of the extremities.

3. Whirlpool and paraffin are two important heating agents employed for therapeutic purposes because of:

- (a) Efficiency, by increasing local and systemic temperatures, within a safe degree of application.
- (b) Safety—No untoward reactions and can be employed thru long periods; and it is not habit forming.
- (c) Comfort to the patient. The psychic effect of well-being and relaxation to the patient, and relief of muscle spasm, prepares the part for better and more effective massage and exercise.
- (d) Relatively low cost in maintenance and in some form or other available to the underprivileged.
- (e) Paraffin increases circulation in the capillaries, stimulates local hyperemia, and improves the condition of the skin. It is simple to apply and the upkeep is in the low cost bracket.
- (f) It can be available in any home.

LITERATURE CITED

1. JOHNSON, P. T.: Manual for Training Physical Therapists. Army School for Training of Physical Therapists. Fort Huachuca, Arizona, 1942.
2. KRUSEN, F. H.: Physical Medicine and Rehabilitation for the Clinician. W. B. Saunders, pp. 1-2, 1951.
3. KRUSEN, F. H.: Physical Medicine, p. 1, 461, 1951.
4. KOVACS, R.: Electrotherapy and Light Therapy. Lea and Febiger, p. 385, 1945.
5. ZEITER, W. J.: Physical Therapy, 20:469-472, 1939.

GAMMA GLOBULIN PROVIDED BY RED CROSS

The American Red Cross began the distribution of gamma globulin in 1944 with the return from the Defense Department of wartime surplus dried blood plasma. A large portion of this plasma was processed by the Red Cross into serum albumin, gamma globulin and other blood derivatives at a cost to the organization of \$7,000,000. When it appeared likely in 1951 that gamma globulin would be valuable in fighting polio, the Red Cross donated 260,000 ccs. of the derivative to the National Foundation for Infantile Paralysis for a series of tests which extended through 1952. In 1953 nearly 5,000,000 cubic centimeters of gamma globulin were provided to fight paralytic poliomyelitis, measles and infectious hepatitis. E. Roland Harriman, chairman of the Red Cross, has stated that the organization will have made available to the American people 19,643,000 ccs. of gamma globulin from 1944 through 1954.